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(54) Improved closing system in plastic tank for washing machine

(57) Improved closing system in plastic tank for washing machine, being of the kind of the plastic tanks that are made up of two halves that are obtained from a mould, staying open the union base in both halves, while the other base of one of the halves coincides with the frontal part of the tank that is relative to the washing machine door and the other one defines the closed back part with the central axial hole for the pass of the drum

spindle, so that the two halves (1) and (2) define the washing machine tank by means of their union and they have a plurality of radial lungs that are backed among them. Thus, the lungs of one of the halves have the respective projections while the backed lungs have the respective passing holes, so that the projections, that are like a right angle to the radial lungs (3) of one of the tank halves (1), are defined by the respective studs (7) which are endowed of an axial central hole.

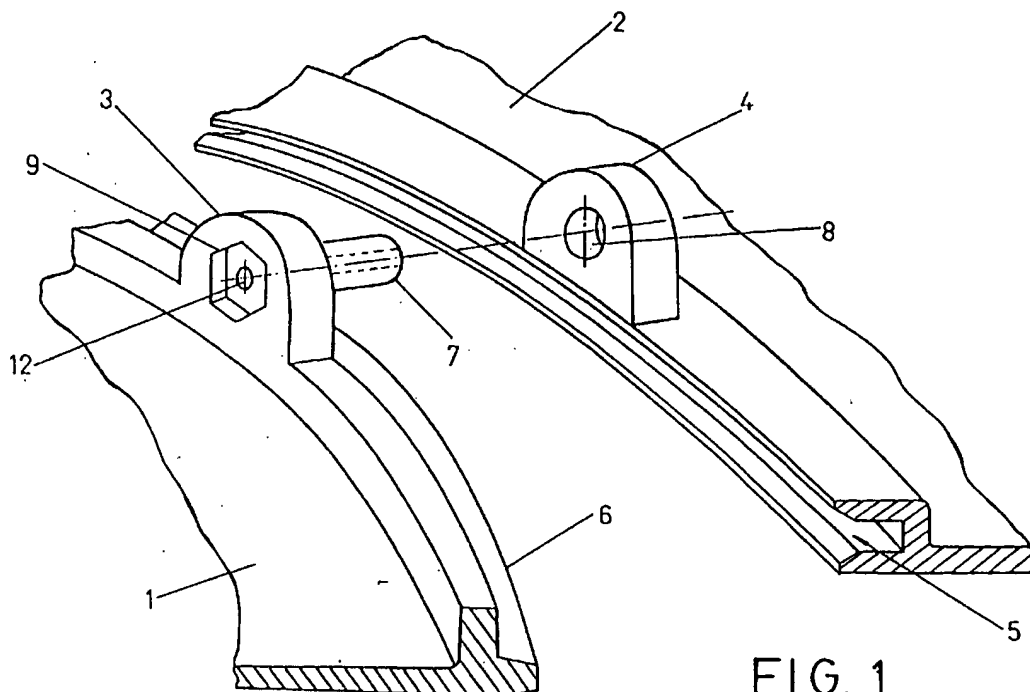


FIG. 1

EP 0 854 223 A2

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**Description****OBJECT OF THE INVENTION.**

As is expressed in the title of the present descriptive report, the following invention consists of an improved closing system in plastic tank for washing machine, being of the kind of those that are made up of two halves that are manufactured from a mould, that are backed and joined through one of their open bases, so that the two halves are susceptible of being separated in case of failure, allowing the access to its internal part for repairing it.

The joining between both halves of the tank is made easy through the closing system that is proposed in the present report by means of a simple and fast operation and with a lesser cost of the materials that are used in the joining, meaning an important economical saving.

Besides, the joining system allows the easy separation of both halves in a fast and easy way by the technical service if its intervention is necessary, for once the failure has been repaired, the two halves of the tank can be joined again in a conventional way through some screws and the corresponding nuts.

Thus, it is a matter of obtaining a closing of both halves of the plastic tank in a totally reliable way so that at the same time they can be separated by the technical service if it is necessary, for being able to be joined again.

Starting from these technical necessities, two practical executions of the invention are described in the present report, so that both executions coincide in their economy and the speed of materialization and assembly, and at the same time in case of necessity, both halves of the tank can be separated and be joined again for a normal working.

Likewise, the applicant of the present dossier is also the applicant of the Invention Patent P9600222 where a closing system for plastic tank of washing machine is claimed, which has the same objectives of obtaining a fast and economical closing system that at the same time it can be taken to pieces and is capable of being assembled again.

**FIELD OF APPLICATION.**

The closing system that is showed in the next report is applicable in the closing of the two halves of a plastic tank of washing machine, so that both halves are obtained from a mould and it is not necessary to increase the complexity of the mould for their manufacture since the elements that materialize the union, that also are obtained from a mould, do not put up the cost of this mould neither the product cost.

Thus, the two tank halves define the structure of this one because of their union through their corresponding central perimeter, with the interposition of the corresponding watertightness joint, so that one of the base

of one of the halves is opened for remaining in relationship to the washing machine door while the other base of the other half defines the closed back part with an axial central hole for the pass of the drum spindle.

**BACKGROUND OF THE INVENTION.**

Conventionally, the plastic tanks of the washing machines are manufactured from a mould, according to two halves that, through their union, form the washing machine tank which will lodge the drum, so that during the manufacture of the own tank body, the accessory elements for its subjection and the union of other elements are defined, as well as being able of materialize the union of the both halves between them for form a watertight body.

Thus, the two halves that form the washing machine tank are joined in a perimetric way according to their central part so that one of the bases of the one of the halves is opened for remaining in relationship to the frontal door of the washing machine, and the other half defines the back part of the tank with the axial central hole for the pass of the spindle of the drum that will lodge the tank.

For materializing the union between the two halves of the tank in relationship to the open base that is joined, some radial lungs are defined, being they endowed of some holes for threading the respective screws that will materialize the union.

Likewise, the corresponding o-ring seal is placed between both union bodies, for assuring a watertight closing.

In this way, the union between both halves will be done through a whole of screws that fix both bodies between them, so that one or various workers must realize the threaded of the screws, being necessary the expense of much time, since we can consider 17 screws are used approximately for the union of both halves.

With this configuration, we must have into account that the amount of cited screws must be used for the obtaining of the tank, with the cost that it means as well as the much time is spent in the threaded of all them, which finally means a high cost as a consequence of the added cost of the screws that are used and the labour that is necessary for carrying out the closing operation.

In this way, the washing machine tank that is configured thus, if because of technical necessities it must be detached, its two halves can be separated unscrewing all the fixing screws, and subsequently it can be assembled again fixing the two halves that form the tank through the union screws.

Likewise and like it has been expressed, the applicant of the present dossier is also the applicant of the Invention Patent P9600222, that claims a closing system for plastic tank of washing machine, which is based fundamentally on the materialization in one of the tank halves of a plurality of projections like tip of harpoon that, in the assembly, remain in relationship to the respective

housings of the other half of the tank, materializing the union through the insertion of the cited projections like tip of harpoon into the respective housings.

This execution allows the separation of both halves in case of necessity, breaking the union elements so that both halves can be joined again through the conventional means because the same ones have the corresponding lungs with some holes for the placement of the respective union screws.

#### DESCRIPTION OF THE INVENTION.

In the present report, an improved closing system for plastic tank in washing machine is described, being of the kind of those tanks that are made up of two halves that are obtained from a mould so that the union base remains open in both halves while the other base of one of the halves coincides with the frontal part of the tank that is relative to the washing machine door, and the other one defines the closed back part with an axial central hole for the pass of the drum spindle, that is characterized because the two halves, that form the washing machine tank through their union, have a plurality of radial lungs that are backed among them, so that the lungs of one of the halves have the respective projections while the backed lungs have the respective passing holes.

Thus, the projections like a right angle in relationship to the external side of the radial lungs of one of the tank halves are defined by the respective studs that are endowed of a central axial hole, which is done in relationship to its birth base in the corresponding lung.

The cited studs, which are interlocked to the lungs of one of the tank halves, have their blocked up central axial hole, so that they remain inserted and jutting out on the holes of the backed lungs of the other half, so that when we applied heat on the free extreme that juts out of the same ones, they founded so that a mass like a fragment of a sphere with bigger diameter than the hole of the lug where they are inserted is defined, being done the fixing because of the solidification and the cooling.

Likewise, the studs that are interlocked to the lungs of one of the tank halves can have passing their axial central hole, remaining inserted and jutting out on the holes of the backed lungs of the other half, so that applying heat on their free extreme their smelting is caused, being defined a mass like a perimetric cord of calf-length section, with a bigger diameter than the hole of the lung where they are inserted, materializing the fixing because of its solidification and cooling, like a rivet.

For the perfect definition of the union process of both halves of the tank because of the smelting of the free extremes of the studs, a constant pressure is done on both halves during the solidification process and the cooling process so that this pressure impedes the possible displacement of both halves because of the pressure that is realized by the o-ring seal.

In the other hand, in a second practical embodiment of the invention, the projections that are like a right angle

with regard to the radial lungs of one of the tank halves, are defined by respective tubular bodies, while the lungs of the other half of tank have a passing hole, with a stretch of truncated cone shape with regard to its internal side, having also in relationship to it a pair of strengthenings that bear a body with a truncated cone shape, being all that obtained in the own manufacture process from a mould of the half of the cited tank.

The tubular projections are endowed in relationship to their free base of a pair of axial clefts, while the lug that they shape has a passing hole in relationship to their central part.

The union of the halves that form the tank will be materialized once the tubular bodies that are interlocked to the lugs are inserted into the respective holes of the lungs that are related to the other half of the tank, through a press knock that will be insert under pressure the bodies with truncated cone shape that are supported by the pair of strengthenings, in the tubular bodies that are aligned with them, opening their extremes on the stretch with truncated cone shape of the hole where they are lodged.

In order to complement the description which is made hereinafter and for the purpose of providing a better understanding of its characteristics, the present descriptive report is accompanied by a set of drawings, in whose figures the most significant details of the invention are represented in an illustrative and not limitative way.

#### BRIEF DESCRIPTIONS OF THE DESIGNS.

Figure 1.- It shows a detailed view in perspective of an union point of the two halves of the plastic tank of the washing machine, where we can observe the stud that is interlocked to one of the lungs, which is endowed of a hole in relationship to its birth, while the cited lung has a hexagonal cope in the opposed side. Besides, we also can observe the lung of the opposed half of the tank, which is endowed of a hole for inserting the cited stud.

Figure 2.- It shows a view of a radial section in relationship to a union point between the two tank halves, in which the stud remains inserted and passing through the hole of the corresponding opposed lung having the cited stud a central axial blocked up hole.

Figure 3.- It shows a view of a radial section in relationship to a union point between the two halves of the tank, that is related to the previous figure, once we have applied heat on the free extreme of the stud for causing its smelting and the fastening between both halves because of the creation of a mass like a fragment of a sphere of bigger diameter than the fitting hole, that will materialize the fixing once it is solidified and cooled.

Figure 4.- It shows a view of a radial section in relationship to a union point between the two tank halves, where the stud remains inserted and passing through the hole of the corresponding confronted lung, being passing the axial central hole of the stud.

Figure 5.- It shows a view of a radial section in relationship to a union point between the two halves of the tank, that is related to the previous figure, once we have applied heat on the free extreme of the stud for causing its smelting and the fastening between both halves because of the creation of a mass like a perimetric cord, like a rivet, of calf-length section of bigger diameter than the fitting hole that will materialize the fixing, once it is solidified and cooled.

Figure 6.- It shows a detailed view in perspective of other practical execution of the invention, in which one radial lung of one of the tank halves has tubular projection like a right angle which has, in relationship to its free base, a pair of axial copes that are diametrically confronted, while the backed lung of the other half of the tank has a passing hole that has a truncated cone shape in the opposed side to the backing side. Thus, we can observe as in relationship to the cited side, it has a body with truncated cone shape that is interlocked to a pair of strengthenings, having been it obtained during the own injection process of the tank body.

Figure 7.- It shows a view of a radial section in relationship to a union point of the two tank halves, that is related to the previous figure, where we can observe like the tubular body, that is related to one lung of one of the halves of the tank, remains inserted and jutting out with regard to the hole of the backed lung of the other half of the tank, so that the body with truncated cone shape remains placed in such a way that it is inserted under pressure into the tubular body through a press knock.

#### DESCRIPTION OF A PREFERRED EMBODIMENT.

In view of the above cited figures and in accordance with the adopted numbering, we can observe as the two halves (1) and (2), that are obtained from a mould and that form the plastic tank of the washing machine through their union, have a plurality of lungs (3) and (4) respectively that are placed in a radial way in relationship to the perimeter of the open base of backing, so that the lungs (3) of one of the tank halves have respective projections in relationship to their internal side, while the lungs (4) of the other half of the tank has a passing hole for the insertion of the cited projections.

In the other hand, the closed base of one of the tank halves has an axial central hole for the pass of the drum spindle, while the other base of the opposed half remains open and placed in relationship to the washing machine door.

Likewise and in relationship to the perimeter of the union base of both halves (1) and (2) that form the washing machine tank, one of them has a housing (5) in which the corresponding o-ring seal is inserted, and a lip (6) of the other opposed half is contacting on it.

Conventionally, and like it was expressed in the Invention Patent P9600222 of the same applicant, where a closing system for plastic tank of washing machine is claimed, the two union halves of the tank have a plurality

of lungs that are endowed of the respective passing holes, so that both halves are backed between them during the assembly, materializing the joining through screws and the corresponding nuts, being this union done with 17 screws more or less. Thus, the cost is increased because of both the cost of the same ones and the time that must be spent in the threaded of all them.

To solve these difficulties, a union system between both halves of the tank through a whole of projections like tip of harpoon that are inserted and fixed into the corresponding housings materializing the union by a press knock already was showed in the cited Invention Patent P9600222. This way of fastening requires the break of the cited for separating both halves during the disassembly of the tank and they must be joined later through the traditional means, since both halves of the tank incorporate the corresponding lungs with their corresponding passing holes, for the placement of the fixing screws.

In the present report a fastening system is described, which is materialized in two practical embodiments of execution so that both embodiments can be detachable for allowing the manipulation of the tank by the technical service in case of damage, being both practical embodiments very economical since they have a great simplicity.

Thus, in a practical embodiment of the invention, the lungs (3) of one of the halves (1) that form the tank, in relationship to its internal side, have each studs (7) that are endowed of an axial central hole while in their opposed side, the cited lungs (3) have a hexagonal emptying (9), while the other half (2) of the tank have respective lungs (4) that are endowed of the corresponding holes (8).

In this way, in the union of the two halves (1) and (2) that form the tank, the studs (7), that are endowed of a blocked up central axial hole (10) in relationship to its birth base, remain passing through the respective holes (8) jutting out in relationship to the fitting lungs so that doing a constant pressure on both halves, there is a supply of heat on the free extremes of the studs that juts out, causing their smelting and the formation of a mass like a fragment of a sphere (11) with a bigger diameter than the hole where the stud is inserted, materializing a perfect closing of both halves after the cooling of the mass.

Likewise, the studs (7) can be endowed of passing axial central hole (12), so that as the heat is centrally supplied, the smelting of their extreme emerges, defining a perimetric cord (13) of calf-length section like a rivet, so that the cooling also materializes a perfect closing between both halves.

The pressure, that is done on the two tank halves during the smelting process of the free extremes of the studs (7), will last until the solidification and cooling of the smelted mass, causing then the perfect closing between both halves.

Definitively, a perfect union is obtained because of

the accurate soldering of the two halves of the tank, being and economical and fast process with the advantage that means the possible separation of both halves (1) and (2) if the technical service has to intervene. This separation will be done through a drill that will drill the accurate unions for leaving them free. The cited operation is favoured by the studs (7) holes that will act as the guide of the bit, remaining some holes totally clean in the lungs (3) and (4), according to the wished diameter for being able to realize the union later union by means of screws.

In a second practical embodiment of the invention, the lungs (3) of one of the halves (1) that form the tank, have each tubular bodies (14) in relationship to their external side. These bodies are endowed in relationship to their free base of a pair of axial clefts (15) so that the cited tubular bodies (14) will remain inserted into the respective holes (16) of the lungs (4) of the opposed half of the tank, jutting out in relationship to the same one, while in the own manufacture process from a mould of the half (2) of the tank, the hole (16) will materialize with a stretch (17) with truncated cone shape in relationship to their internal side and likewise, some strengthenings (18) that supportes a body with truncated cone shape (19) in aligned position with the hole (16) of the corresponding lung (4).

Starting from this configuration, at the moment of the union of between halves (1) and (2) of the tank, the tubular projections (14) that are inserted into the corresponding holes (16) and jutting out with regard to these holes, executing a press knock on the bodies (19) with truncated cone shape, the liberation of these bodies will cause with regard to the strengthenings (18) of support, pressing the respective tubular bodies (14) so that the divergence of the extreme branches that are defined in the same ones by the clefts (15), for being adapted to the stretch (17) with truncated cone shape of the hole (16) materializing the union between both halves.

Although the described fixing remain perfectly fastened, for assuring the placement of the bodies (19), the tubular projections (14) can have some projections (20) in its internal side against-exit, that assure the fixing of the cited bodies (19) with truncated cone shape.

Once the two halves (1) and (2) of the tank remain joined, their liberation can be realized if we act with a drill on the union points, like in the case that has been described before. For this, the lungs (3) have, in a central and axial way with regard to the tubular projections (14), a hole that makes easy to guide the bit and likewise, they have a hexagonal reduce for the seat of the head of the corresponding back fixing screw of both halves.

Definitively, a fast and secure union is obtained that can be detached by the technical service if it is necessary, for being both halves assembled again through the traditional means and the corresponding nuts, placed in relationship to the respective holes of the lungs (3) and (4).

## Claims

1. IMPROVED CLOSING SYSTEM IN PLASTIC TANK FOR WASHING MACHINE, being of the kind of those that are made up of two halves that are obtained from a mould, staying opened the union base in both halves, while the other base of one of the halves coincides with the frontal part of the tank that is relative to the washing machine door and the other one defines the closed back part with the axial central hole for the pass of the drum spindle, characterized because the halves (1) and (2), that form the washing machine tank by means of their union, have a plurality of radial lungs that are backed among them, so that the lungs of one of the halves have the respective projections while the backed lungs have the respective passing holes.
2. IMPROVED CLOSING SYSTEM IN PLASTIC TANK FOR WASHING MACHINE according to the first claim and characterized because the projections, that are like a right angle to the radial lungs (3) of one of the halves (1) of the tank, are made up of the respective studs (7) that are endowed of a central axial hole.
3. IMPROVED CLOSING SYSTEM IN PLASTIC TANK FOR WASHING MACHINE according to the previous claims and characterized because the studs (7), which are interlocked to the lungs (3) of one of the halves (1) of the tank, have a blocked up axial central hole, so that they stay inserted and jutting out on the holes (8) of the backed lungs (4) of the other half (2) whose other free extreme is heated, founding it for defining a mass like a fragment of a sphere (11) with a bigger diameter than the hole (8), materializing the fixing because of its solidification and cooling.
4. IMPROVED CLOSING SYSTEM IN PLASTIC TANK FOR WASHING MACHINE according to the first and second claims and characterized because the studs (7), which are interlocked to the lungs (3) of one of the halves (1) of the tank, have a passing axial central hole, so that they stay inserted and jutting out on the holes (8) of the backed lungs (4) of the other half (2), being applied heat on their free extreme. In this way, it is founded for defining a mass like a perimetric cord (13) of calf-length section, with a bigger diameter than the hole (8), materializing the fixing because of its solidification and cooling.
5. IMPROVED CLOSING SYSTEM IN PLASTIC TANK FOR WASHING MACHINE according to the previous claims and characterized because during the smelting process of the free extremes of the studs (7) and the solidification process and cooling

process of the smelted mass, a constant pressure is done on both halves, so that it allows the perfect union and shape of the tank.

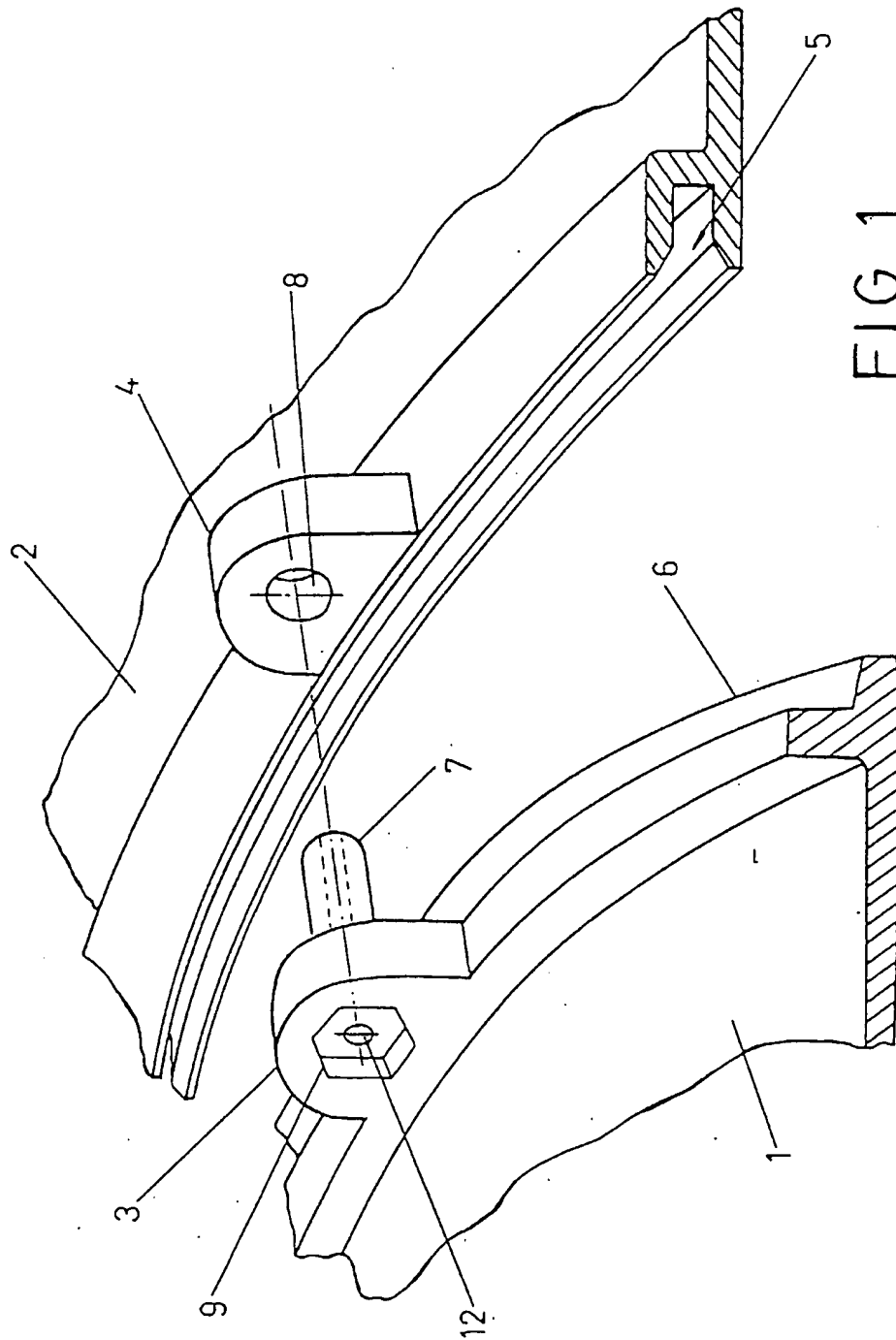
6. IMPROVED CLOSING SYSTEM IN PLASTIC TANK FOR WASHING MACHINE according to the first claim and characterized because the projections, that are like a right angle to the radial lungs (3) of one of the halves (1) of the tank, are defined by respective tubular bodies (14) while the lungs (4) of the other half (2) of the tank have a passing hole (16) with a stretch with a truncated cone shape (17) with regard to its internal side and the system also has a pair of strengthenings (18), in relationship to the cited internal side, that bear a body (19) with a truncated cone shape, being all obtained during the own manufacture process starting from a mould of the half (2) of the tank.
7. IMPROVED CLOSING SYSTEM IN PLASTIC TANK FOR WASHING MACHINE according to the first and sixth claims and characterized because both tubular projections (14) are endowed of a pair of axial clefts (15) in relationship to its free base while they have a passing hole in relationship to its central part.
8. IMPROVED CLOSING SYSTEM IN PLASTIC TANK FOR WASHING MACHINE according to the first, sixth and seventh claims and characterized because the union of the halves (1) and (2) will be done once the tubular bodies (14) are inserted into the respective holes (16) through a press knock that will introduce the bodies (19) into the tubular bodies (14) under pressure so that the extremes of these bodies will be opened on the stretch with truncated cone shape of the hole (16) where they are lodged.

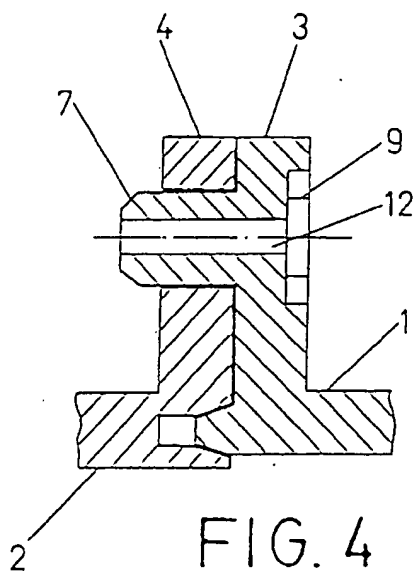
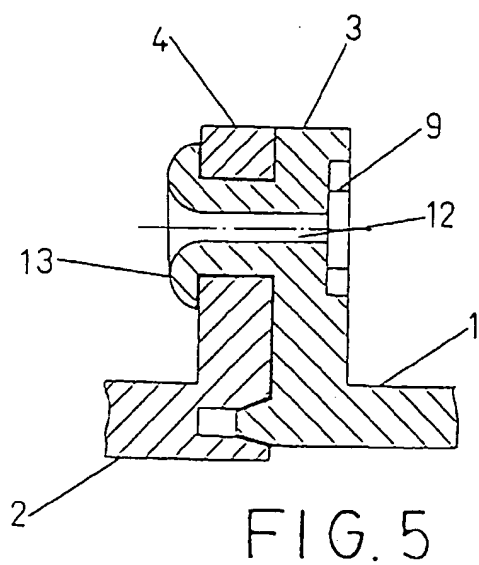
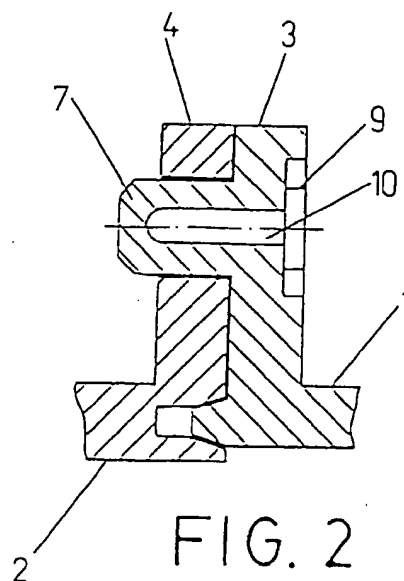
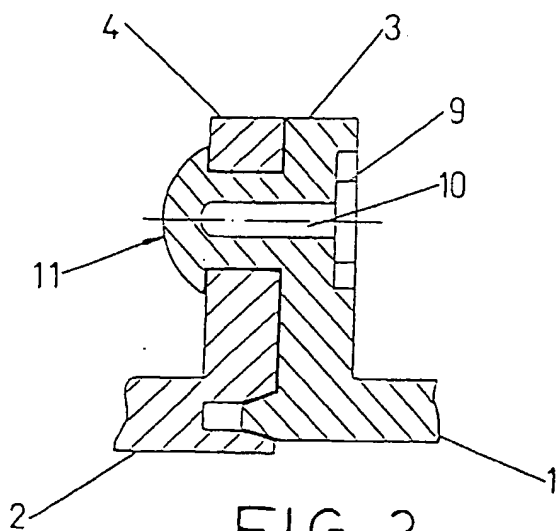
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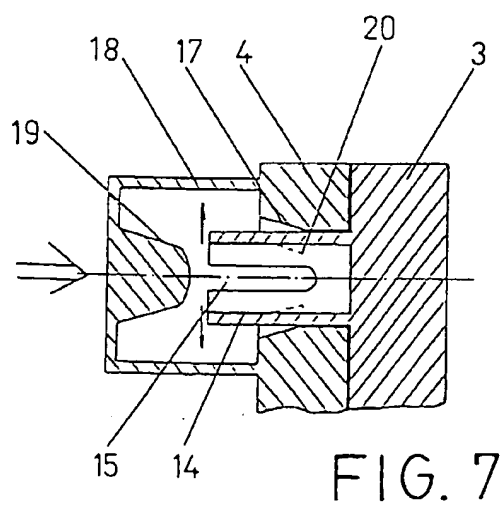
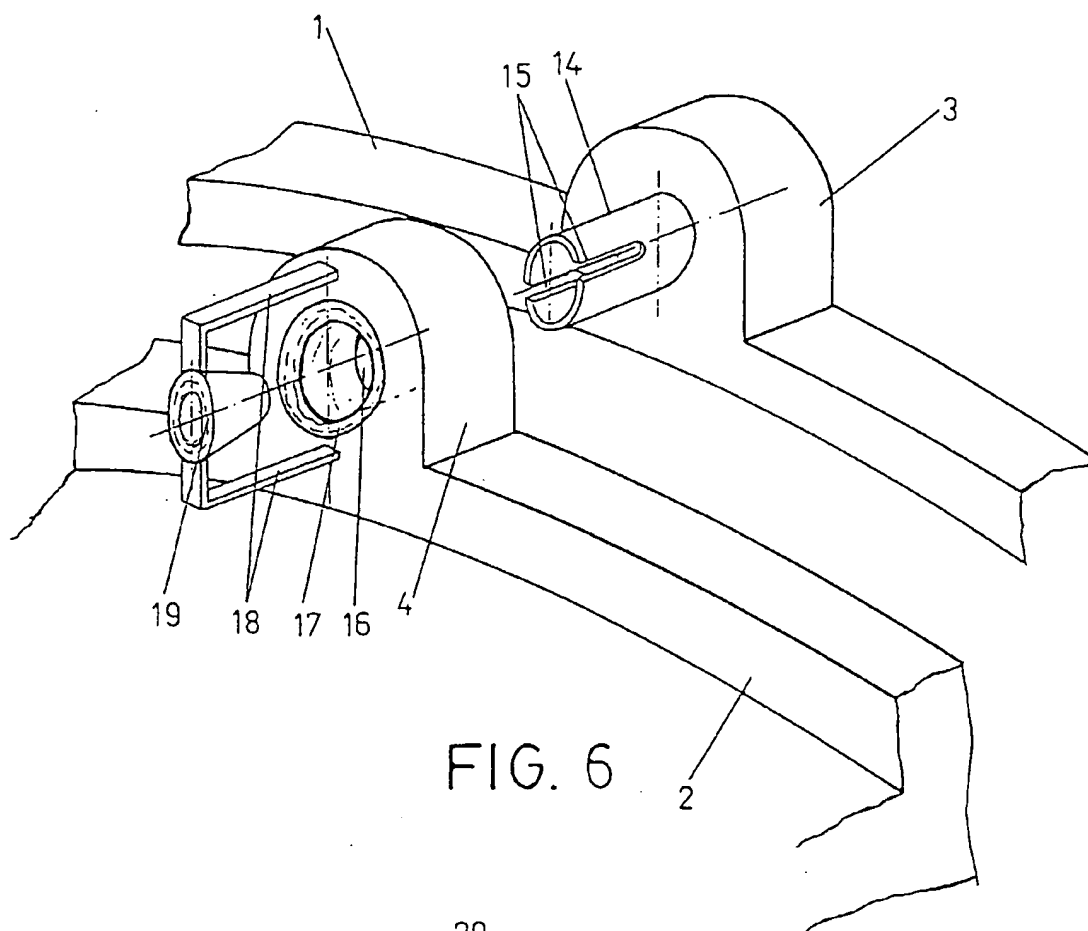
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